

The Length of Vermeer's Studio

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Abstract

The purpose of this project is to verify that the artist Johannes Vermeer painted *The Music Lesson* and *A Lady Standing at a Virginal* in the same room. The main objective is to elucidate the methods used by Tomas Garcia-Salgado by calculating the numerical values mentioned in his paper and compare the calculations with the findings in Aditya Liviandi's thesis.

PROJECTIVE GEOMETRY

Projective geometry refers to the field of Mathematics which assigns points on a two-dimensional image to points in three-dimensional real-world space and vice versa. A painting can be regarded as a two-dimensional image. The three-dimensional real-world space where the painting is painted can be reconstructed from the two-dimensional image. The depiction of objects in a painting is constructed by linear perspective, which is a mathematical representation of three-dimensional objects on a two-dimensional surface as viewed by the observer. This is accomplished through the use of lines that converge at one point to represent a set of parallel lines in three-dimensional real-world space on a two-dimensional painting. Any set of parallel lines in three-dimensional space that are depicted in a painting and are not parallel to the plane of the painting will in its two-dimensional representation appear to converge at a point called a vanishing point

JOHANNES VERMEER'S POSSIBLE USE OF CAMERA OBSCURA

The camera obscura is a device which includes a lens or a pinhole, with which an image of a scene viewed by an observer can be projected onto a screen. The projected image on the screen can then be traced. Many people have speculated that the Dutch artist Johannes Vermeer (1632-75) used the camera obscura to help him create his paintings, based on general observations of his paintings and the availability of the camera obscura to him.

THE BACK WALL OF THE MUSIC LESSON

Philip Steadman presented an analysis of the perspective geometry of Vermeer's paintings which provides evidence for Vermeer's use of the camera obscura. Steadman argues that most of Vermeer's paintings were painted in the same room and Vermeer

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constructed his perspective views with a high precision that the shape and dimensions of the room can be measured to a high degree of accuracy. Steadman was able to determine the observer point for at least six of Vermeer's paintings and determine the back wall position using the mirror reflection in *The Music Lesson*. The intersection of the visual pyramids of other paintings with the back wall forms a rectangular area which Steadman measures to be almost exactly the same dimensions as the actual paintings. This results lead to Steadman concluding that Vermeer painted at least six paintings in the same room.

MODULAR PERSPECTIVE METHOD BY TOMAS GARCIA-SALGADO

Garcia-Salgado makes references to the results obtained by Steadman and hypothesizes that the rooms in which Vermeer painted share the same back wall as *The Music Lesson*. However, unlike Steadman, Garcia-Salgado attempts to use the Modular Perspective Method to verify that the rooms depicted in the paintings of Vermeer are the same room. One of the key concepts introduced by Garcia-Salgado is the use of the term "module". Garcia-Salgado uses the term "module" to refer to an object at a certain depth in the picture, which can be regarded as a unit of measurement for lengths of other objects at the same depth. Another key concept on Garcia-Salgado's modular perspective method is the shifting of the picture within the visual pyramid. The size of the picture changes as it is shifted within the visual pyramid. The absolute length of the module changes at the same scaling factor at which the image size changes. As a result, the distance between the central and side vanishing points remain the same in terms of the number of modules.

CONCLUSION

In this paper, we will show how Garcia-Salgado's modular perspective method works in verifying that the dimensions of the rooms depicted *The Music Lesson* and *A Lady Standing at a Virginal* are the same. We will also analyse the assumptions made by Garcia-Salgado and suggest improvement to minimise the extent of error in the numerical values obtained by Garcia-Salgado.

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